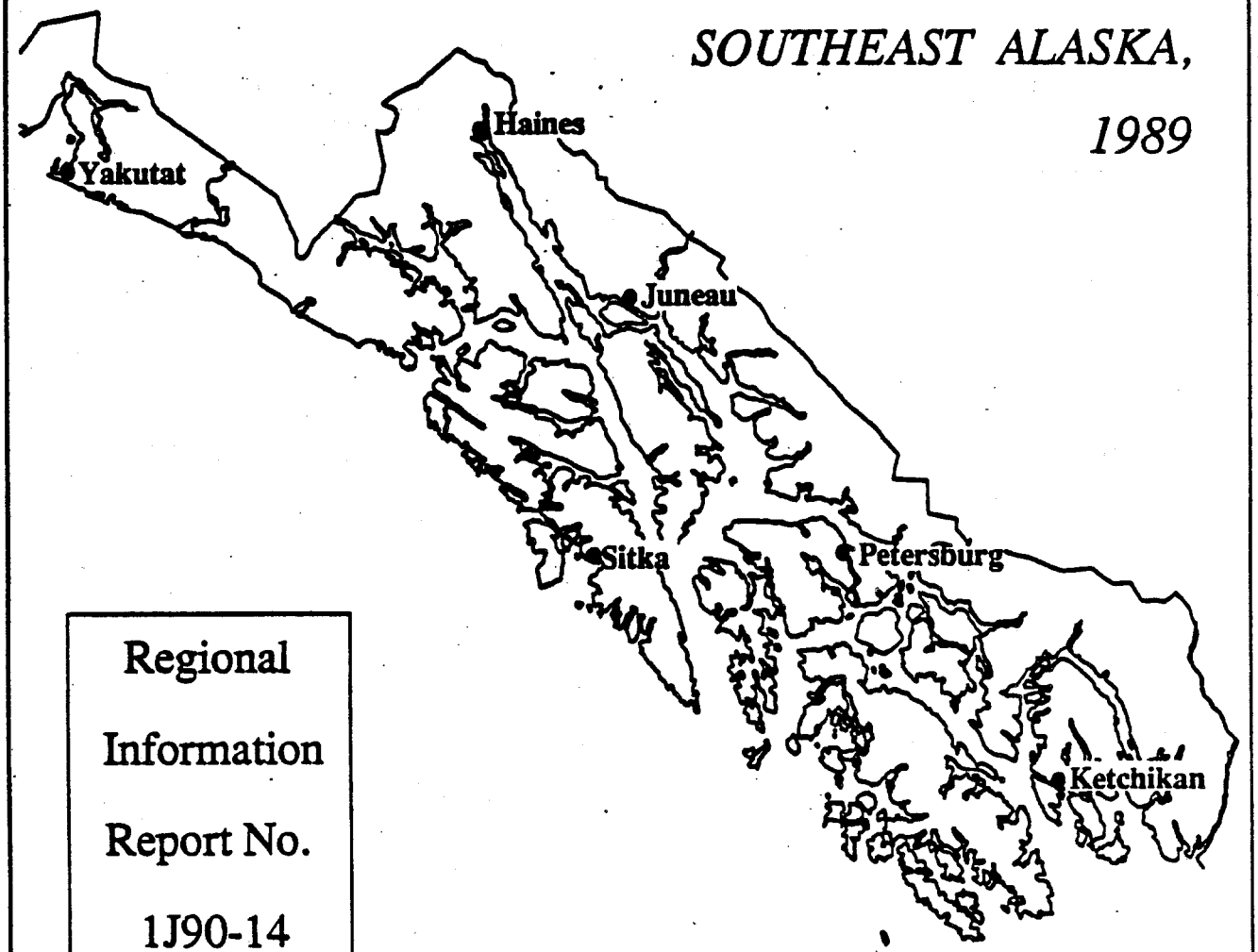
Alaska Department of Fish & Game

Commercial Fisheries Division -- Southeast Region

MATURITY ESTIMATES OF CHINOOK SALMON CATCH IN JUNE FISHERIES IN SOUTHEAST ALASKA, 1989



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By

Keith A. Pahlke

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AUTHOR

Keith Pahlke is the Assistant Project Leader for the Chinook Salmon Stock Assessment Program for the Division of Commercial Fisheries, Southeast Region, P.O. Box 20, Douglas, Alaska 99824.

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INTRODUCTION

Southeast Alaskan chinook salmon stocks are all spring spawning fish, entering their natal rivers in April, May and June (Mecum and Kissner 1989). Mature fish captured in Southeast waters in June are almost certainly spawners returning either to Southeast Alaska and Transboundary river systems, or to Alaskan hatcheries. The contribution to the catch of Alaskan and non-Alaskan hatcheries is estimated each year by the expansion of coded-wire tag recoveries from tagged hatchery stocks. The contribution of wild stocks can not be estimated so easily as very few are tagged. One method of estimating the contribution of wild Alaskan and transboundary river stocks to June fisheries is maturity sampling. Salmon maturity can be estimated from either the development of the gonads or the external appearance of the fish.

Troll caught chinook salmon are sold dressed, with the entrails and gonads removed. Thus, unless the fishermen save the gonads of individual fish the gonad method of maturity estimation can not be used for troll caught fish.

In June 1988, volunteer fishermen provided gonads from 146 chinook caught in Frederick Sound (District 110). The maturity of the fish was estimated by external appearance and compared with gonad maturity. Agreement between the two methods was 79% (Pahlke and Mecum 1989).

Locations of June Fishing Areas

Experimental troll fisheries were conducted during June, 1989 in near-terminal and terminal hatchery areas under regulations adopted by the Alaska Board of Fisheries (ADF&G 1989). The main objective of these experimental fisheries, first conducted in 1986, was to increase the troll fishery harvest of mature Alaska hatchery chinook salmon (*Oncorhynchus tshawytscha*)(ADF&G 1988). These areas were adjacent to the Crystal Lake (Alaska Department of Fish and Game, ADF&G), Little Port Walter (National Marine Fisheries Service, NMFS), Neets Bay and Whitman Lake (Southern Southeast Regional Aquaculture Association, SSRAA), and Medvejie (Northern Southeast Alaska Regional Aquaculture Association, NSRAA) hatcheries (Figure 1). An experimental troll fishery was also conducted in the Cross Sound (Inian Islands) area to determine the feasibility of harvesting pink and chum salmon during the spring with commercial troll gear. In addition, terminal troll fisheries were conducted in Wrangell Narrows near the Crystal Lake Hatchery, in Carroll Inlet near Ketchikan (a remote release site for the Whitman Lake Hatchery), in Earl West Cove (remote release site for Crystal Lake Hatchery) and in Neets Bay (Neets Bay Hatchery) near Ketchikan.

Openings in the experimental troll areas were limited to specific weekly periods to reduce harvests of non-Alaska hatchery stocks of chinook salmon and to hold total harvests below guidelines established by the Board. The Carroll Inlet, Neets Bay, Wrangell Narrows, and Earl West Cove fisheries were terminal fisheries designed to harvest surplus chinook salmon not required for broodstock.

In 1989 two special hatchery access (HA) troll periods were authorized by the Alaska Board of Fisheries. The new regulations established two special 3-day openings to allow access to Alaskan produced hatchery chinook, primarily in inside waters, from June 5 through June 7 and again from June 21 through June 23 (Figure 2). A detailed description of the areas and times open is found in the 1989 Alaska Commercial Salmon Trolling Regulatory Guide.

The hatchery access troll fisheries harvested 31,200 chinook salmon in 1989, of which 14% were estimated to be Alaskan hatchery fish. In addition, the experimental and terminal troll fisheries harvested approximately 2,240 and 1,000 chinook salmon, respectively, of which 41% were produced by Alaska hatcheries.

Gill net fisheries in Southeast Alaska traditionally begin in the third week in June, targeting on returning sockeye and pink salmon. In 1989, 10,800 chinook salmon were caught incidentally in these fisheries.

METHODS

Maturity can be estimated by two methods: examination of the gonads and external appearance of the fish. A mature spring spawning chinook salmon has well developed gonads; females have eggs greater than 4.0 mm diameter and males have large, easily seen gonads. Immature salmon have less developed gonads with eggs less than 3.5 mm diameter in females and small, difficult to see gonads in males (Kissner 1973).

Externally, the differences are more subtle. The scales on mature chinook salmon are difficult to remove and there are usually very few missing scales. The color of the fish is darker, especially on the head and branchiostegal rays. The scales on immature fish flake off easily and are often missing. Immature fish are lighter colored in comparison with mature fish. The branchiostegal rays are white.

External estimation of chinook salmon maturity was done in conjunction with routine catch sampling at ports throughout Southeast Alaska in June, 1989. Each fish examined was estimated to be mature, immature, or maturity unknown and the information was recorded along with length and scale data. Samplers were urged to call a fish "unknown" if they had any uncertainty.

RESULTS

Over 1,778 fish were examined from eight troll fishing areas and 264 from three gill net areas (Table 1 and Figure 3). The proportion of mature fish ranged from less than 1% in the District 103 troll catch to 100% in the District 106 gill net catch. All eight gill net and 21 of the 22 troll caught chinook that were estimated to be mature and also had coded-wire tags (CWT) were found to be Alaskan hatchery fish (Table 2).

DISCUSSION

Only 1 out of 30 CWT tagged chinook estimated to be mature was from a non-Alaskan hatchery. The non-Alaskan fish was a large, age-1.3 summer run chinook returning to the Kitimat River in northern British Columbia. External maturity estimation is subjective; compared to immature feeders this fish appeared to be mature. This indicates that the number of fish estimated to be mature which are not mature is low. The converse error, the number of fish estimated to be immature which are actually mature has not been determined.

In the experimental and hatchery access troll fisheries the proportion of mature fish declined from early to late June. This was also seen in 1988 in District 110 and was expected, as most Alaskan and transboundary river spawners have passed through the fishing areas by late June (Pahlke and Mecum 1989).

Using the external examination method, Kissner and Hubartt (1986) found high proportions of mature fish (assumed to be Taku River spawners) in District 111 gill net catches in June openings, 1979-1985. The proportion of spawners in week 25 (average mid-day June 18) ranged from 30 to 73%. The proportion of immature fish (feeders) increased slowly between week 25 and 28.

Sport fish harvests have shown similar trends in maturity over the fishing season (Neimark 1985; Suchanek 1989). Based on egg size, Neimark estimated the percentage of mature fish caught in April-June to be 80% in Haines, 26% in Juneau, 63% in Ketchikan, 55% in Petersburg, 82% in Wrangell, and 10% in Sitka. The percentage mature in July-September dropped to 0% in the Juneau area, the only area

sampled. Suchanek found mature spring spawners composed 74% of the Taku Inlet harvest from April 24 to June 18, 1989. After June 18 the percentage mature dropped to less than 20%.

The District 114 hatchery access opening from June 5-7 had a high proportion of mature fish sampled (59%). This is interesting, as District 114, unlike the other fishing areas with high numbers of mature fish, was not near any hatcheries or enhancement projects that expected adult returns in 1989. The district consists primarily of Icy Strait and Glacier Bay and the mature wild spawners harvested there were probably Chilkat River, and perhaps Taku River fish. Two wild fish that were CWT tagged in the Tahini River, a Chilkat River tributary, were caught during the first June opening. Maturity was not estimated for those two fish; however, two mature CWT tagged fish were recovered from both Little Port Walter and Snettisham and one from Hidden Falls Hatchery. Immature CWT tagged fish were harvested in District 114 from those three hatcheries and also Whitman Lake, Crystal Lake, and British Columbia hatcheries. Icy Strait is apparently a corridor for all northern Southeast Alaska chinook stocks and a rearing area for many other stocks. The Chilkat River stock has declined in recent years and efforts have been made to decrease the commercial harvest of the stock which is very important to the Haines area sport fishery.

The District 115 gill net fishery is a terminal area for Chilkat River salmon and substantial numbers of chinook are captured incidentally to the harvest of sockeye salmon. Unfortunately, no maturity samples were collected from the catch which could have been used as an indication of Chilkat River chinook salmon interception.

Maturity estimation by the external appearance of chinook salmon is a simple and easy method of estimating the contribution of mature Southeast Alaska and transboundary river wild and hatchery stocks to June fisheries. When combined with age composition and CWT estimates of Alaskan hatchery contributions it provides a simple minimum estimate of Alaska and transboundary river wild chinook stock contribution (Van Alen et al 1986). In lieu of coded wire tagging of wild stocks or perhaps genetic stock ID (GSI) programs, maturity is the only method available for making these estimates.

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Table 1. Chinook salmon maturity in June fisheries, 1989, as determined by external appearance.

District	Week	Immature	Percent	Mature	Percent	Other	Total
			Troll				
101	all	35	54.7	23	35.9	6	64
101-27	23	5	35.7	9	64.3		14
101-90	26	30	68.2	14	31.8		44
102	23	105	90.5	11	9.5	0	116
103	all	179	99.4	1	0.6	0	180
109	all	231	74.0	80	25.6	1	312
	23	49	55.7	39	44.3		88
	24-25	99	79.2	26	20.8		125
	26	86	86.0	14	14.0		100
110	all	232	61.2	144	38.0	3	379
	23	131	53.7	113	46.3		244
	24	5	71.4	2	28.6		7
	25	104	77.0	31	23.0		135
112		11	64.7	6	35.3	0	17
113		515	97.0	15	2.8	1	531
114	all	94	52.5	83	46.4	2	179
	23	57	41.0	82	59.0		139
	24	12	100.0	0	0.0		12
	25	29	96.7	1	3.3		30
			Gill Net				
101	25	22	55.0	18	45.0		40
	26-28	32	72.7	12	27.3		44
106	26	0	0.0	10	100.0		10
111	25	38	27.3	101	72.7		139
	26	3	9.7	28	90.3		31

Table 2. Origins of mature CWT tagged chinook salmon in June fisheries, 1989.

District	Gear	Head #	Hatchery
101	Gill Net	22083	Whitman Lake
106	Gill Net	65709	Crystal Lake
111	Gill Net	37753	Snettisham
111	Gill Net	37754	Snettisham
111	Gill Net	65303	Little Port Walter
111	Gill Net	65304	Snettisham
111	Gill Net	65305	Snettisham
111	Gill Net	65307	Snettisham
101	Troll	22804	Neets Bay
102	Troll	22023	Whitman Lake
110	Troll	13449	Kitimat, Northern B.C.
110	Troll	13447	Little Port Walter
110	Troll	13448	Crystal Lake
110	Troll	37688	Little Port Walter
110	Troll	37689	Little Port Walter
110	Troll	65372	Little Port Walter
110	Troll	65371	Little Port Walter
110	Troll	65359	Crystal Lake
110	Troll	13442	Little Port Walter
110	Troll	13443	Snettisham
113	Troll	70201	Medivijie
113	Troll	70203	Little Port Walter
113	Troll	70217	Tamgass Creek
113	Troll	70172	Sheldon Jackson
113	Troll	37806	Whitman Lake
114	Troll	39516	Little Port Walter
114	Troll	39517	Hidden Falls
114	Troll	39562	Little Port Walter
114	Troll	13432	Snettisham
114	Troll	13433	Snettisham

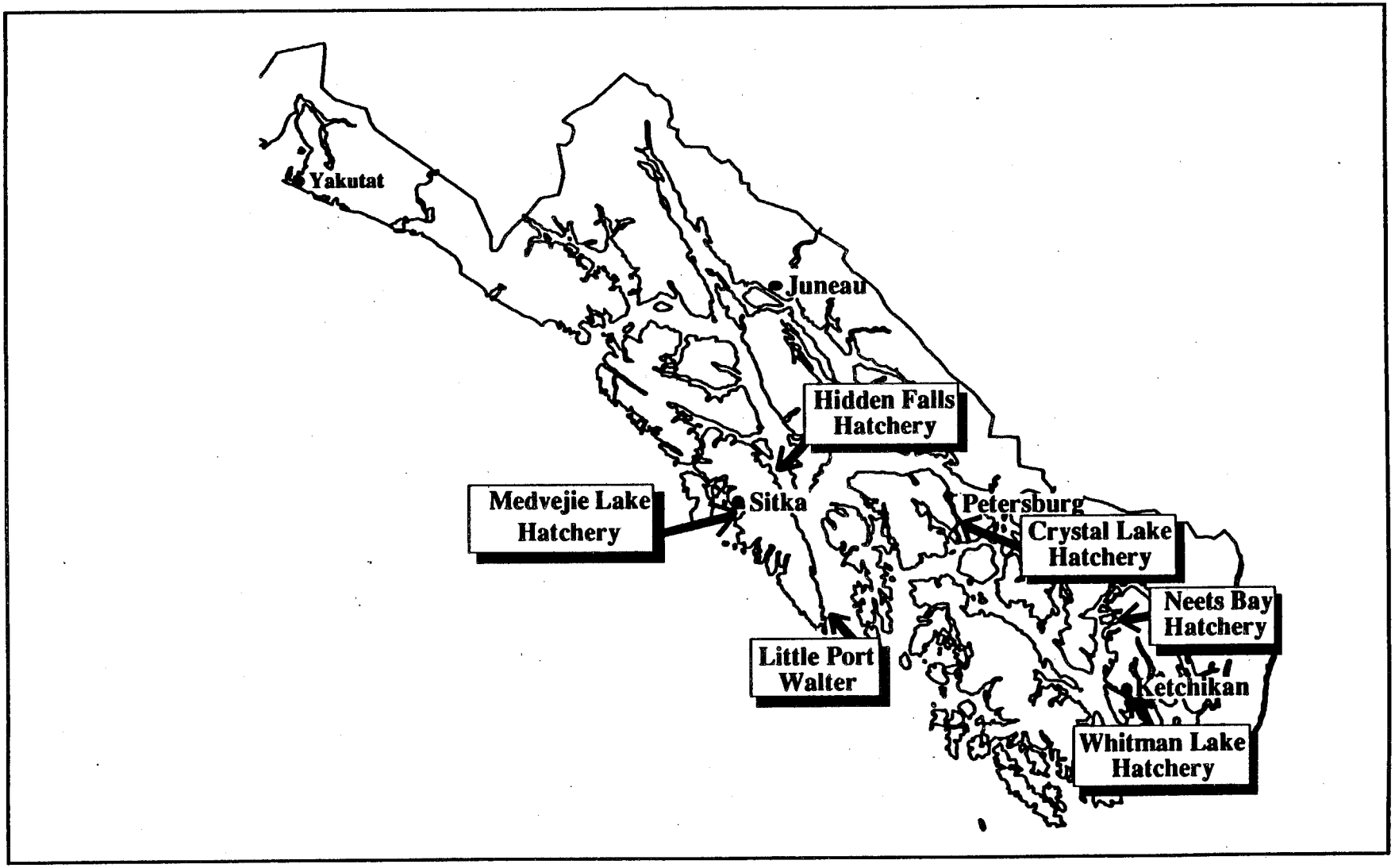

Figure 1. Locations of Southeast Alaska hatcheries contributing chinook salmon to 1989 experimental and terminal fisheries.

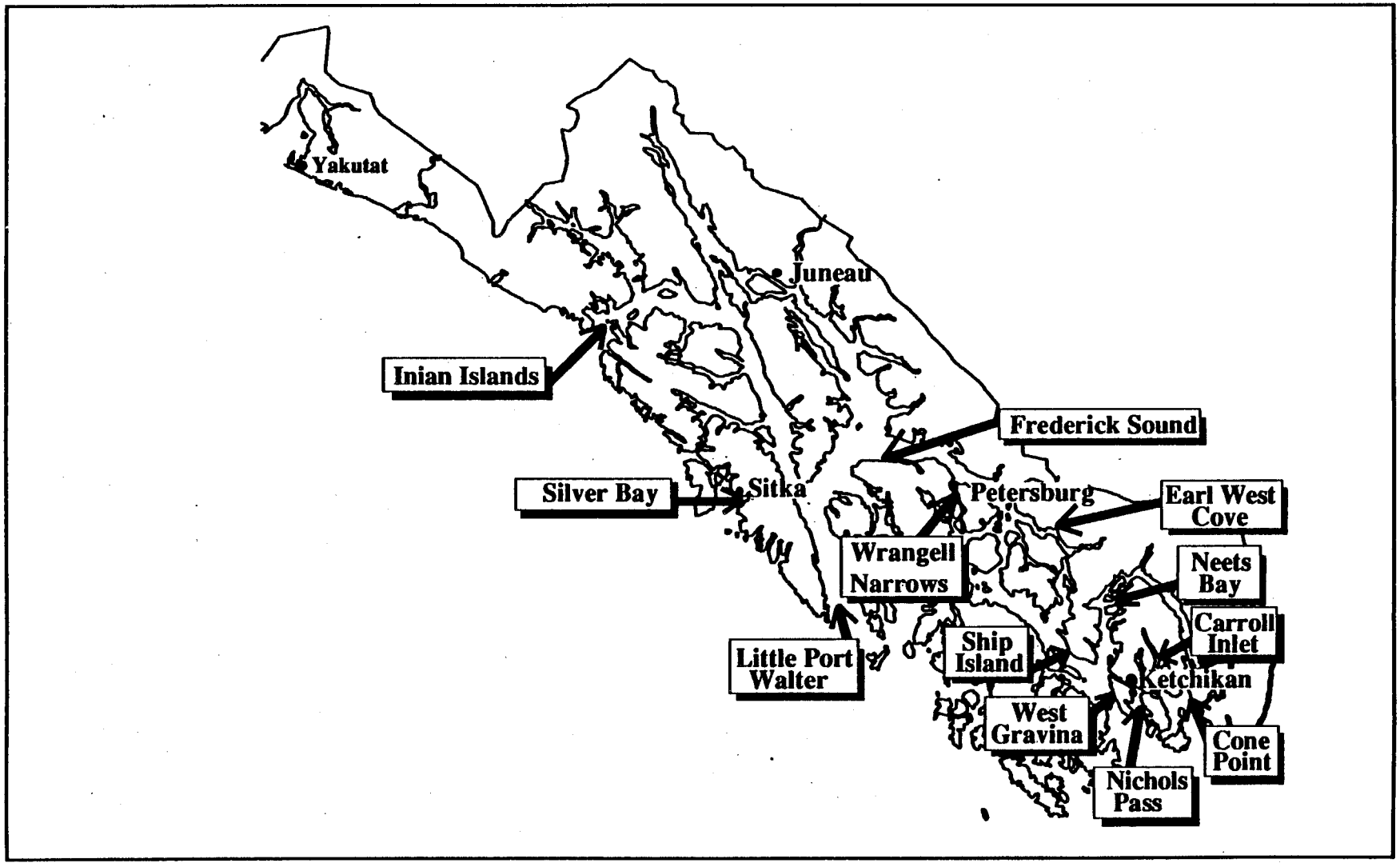

Figure 2. Experimental and terminal troll fishing areas in 1989.

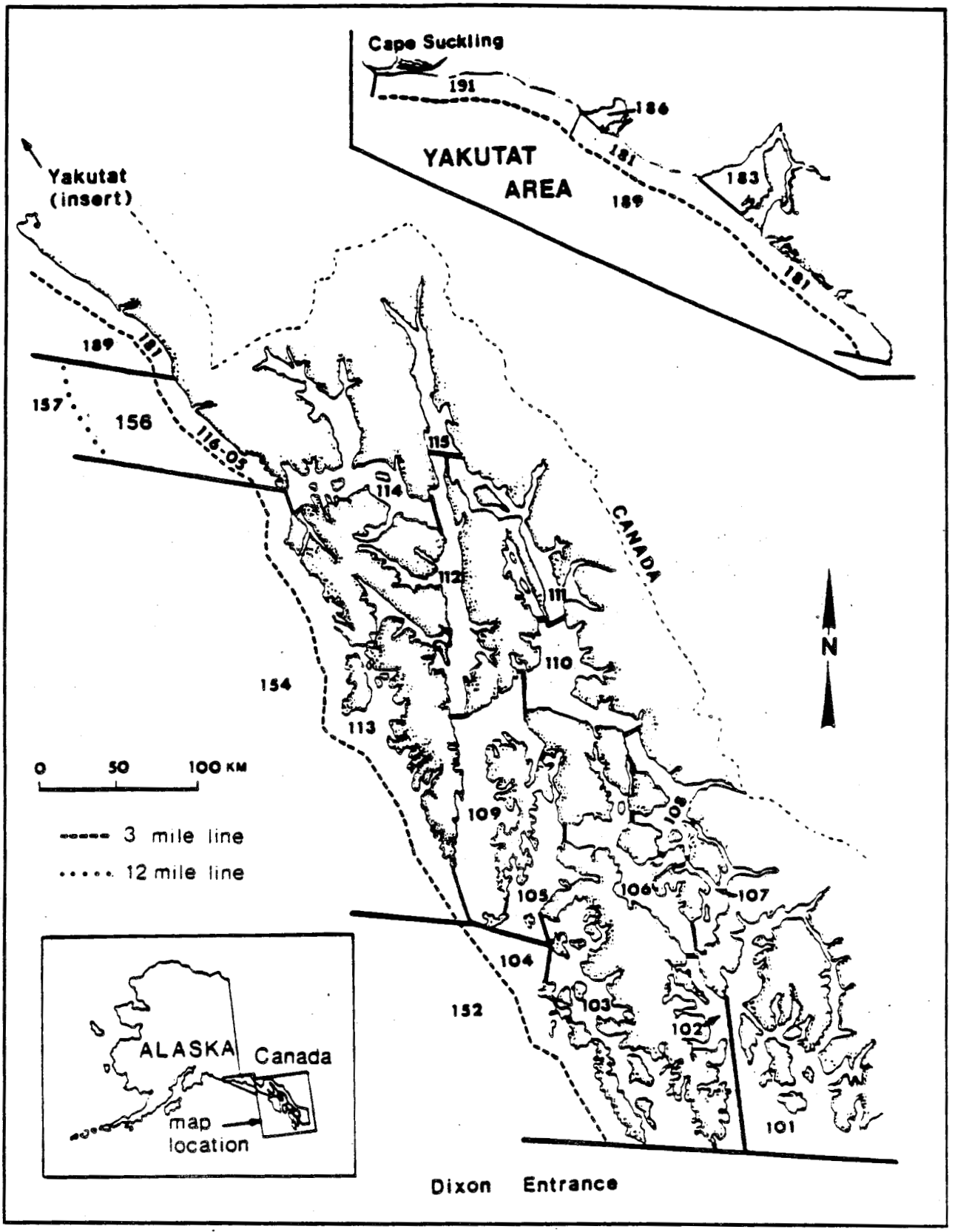

Figure 3. Southeast Alaska fishing districts.